AMENDMENTS TO THE CLAIMS

1.- 21. (Canceled).

22. (Original) Electrical apparatus comprising:

a first contact element with a flexible whip-like structure including a rod with a conductive path along at least a surface of the rod;

a second contact element that includes a rod portion having an end proximate to which there is joined with the rod portion a first end of a pin on which a roller, with an outer rim, is located and free to rotate, a second end of the pin being joined with a cam bar, and the rod portion, pin, roller, and cam bar all being electrically conductive;

the first and second contact elements being conductively attached respectively to first and second relatively movable electrically conductive parts in a combination in which the first and second electrically conductive parts are relatively moveable from a first position to a second position and from the second position to the first position during which movements the first and second contact elements make sliding conductive engagement including, in movement from the first position to the second position, sliding conductive engagement of the conductive path of the first contact element with the rim of the roller of the second contact element.

23. (Original) The electrical apparatus of claim 22 where:

the rod of the first contact element includes a tip portion of a nonmetallic material having one or more conductors on its surface that is joined with an end of an all-metal base portion with continuous conductivity between

the base portion and the conductive path on the tip portion and an opposite end of the base portion is joined with the first relatively movable electrically conductive part;

the combination being arranged so that, in a movement from the first position to the second position, sliding conductive engagement of the first and second contact elements occurs between the base portion of the first contact element and the rod portion of the second contact element and, subsequently in such movement, between the conductive path on the tip portion of the first contact element and the rim of the roller of the second contact; and,

in a movement from the second position to the first position, sliding conductive engagement of the first and second contact elements occurs, in sequence, between the base portion of the first contact element and the cam bar of the second contact element and, subsequently in such movement, between the base portion of the first contact element and the rod portion of the second contact element.

24. (currently amended) The electrical apparatus of claim 23 where:

the nonmetallic material of the tip portion of the first electrical contact ~~principally~~ comprises fiber-reinforced plastic;

the arrangement is such that the conductive path on the nonmetallic material of the first contact element conductively engages the second contact element only at the rim of the roller and only in a movement of the parts from the first position to the second position.

25. (original) The electrical apparatus of claim 23 where:

the first and second relatively movable parts are respective contact arms of an air break switch that each support respective switch contacts; and

the movement from the first to the second position is a movement from a closed position to an open position of the switch contacts and a movement from the second position to the first position is a movement from an open position to a closed position of the switch contacts.

26. (previously presented) The electrical apparatus of claim 25 where:

the sliding engagement, during movement from the closed to the open position, of the base portion of the first contact element with the rod portion of the second contact element initially occurs prior to separation of the switch contacts and that of the conductive path on the tip portion of the first contact element with the rim of the roller of the second contact element occurs after separation of the switch contacts.

27. (previously presented) An air break switch comprising:

first and second interengaging switch contacts and a switch operating mechanism for opening and closing operations of the switch contacts by relative movement of the contacts;

an arc extinguishing whip and a latch conductively connected with respective ones of the contacts;

the whip having a first all-metal portion conductively connected with one of the contacts and a second portion comprising one or more concentric rods of material of a different composition than the first portion with a continuous conductive path on an exterior surface of the outermost rod that includes one or more conductors having

one or more metal strands bonded to the surface of the rod by an adhesive, and with the conductive path on the outermost rod connected with the first portion at a joint including a metal spine located within the interior of the second portion;

the latch including conductive members comprising a rod portion connected at one end with the other of the contacts and having a second end proximate to which a pin is attached to the rod portion with a roller free to rotate thereon, the latch further comprising a cam bar attached to the pin on a side of the roller opposite the rod portion;

the whip, the latch and the respective contacts being arranged in a combination that has sliding conductive engagement between the whip and the latch during opening and closing operations of the switch contacts by the switch operating mechanism including, in a switch opening operation, sliding conductive engagement of the conductive path on the whip second portion with the roller of the latch.

28. (currently amended) A switch in accordance with claim 27 where:

the one or more rods of the whip second portion comprise fiber-reinforced plastic material;

the one or more metal conductors on the exterior surface of the outermost nonmetallic rod include at least one conductor selected from the group consisting of metal braids and metal wires and the adhesive by which bonding of the conductors to the surface occurs includes a resinous material containing metallic particles;

the one or more nonmetallic rods of the whip second portion are tapered, tubular rods with their one or more blunt ends firmly together at a common axial point

within [[a]] the joint with the whip first portion with each other and with the metal spine which is tapered in the same direction as the nonmetallic rod or rods; and

the combination of whip, latch and contacts has sliding conductive engagement during a switch opening operation between the whip first portion and the latch rod portion prior to engagement of the whip second portion with the roller; and the combination of whip, latch and contacts also has sliding conductive engagement during a switch closing operation between the whip first portion and the latch cam bar prior to engagement between the whip first portion and the latch rod portion.

29. (original) A switch in accordance with claim 27 where:

the switch is a center break switch with the switch contacts conductively joined with respective contact arms that both are subject to movement by the switch operating mechanism.

30. (original) A switch in accordance with claim 27 where:

the switch is a vertical break switch with the one of the switch contacts to which the whip is conductively connected being joined with a contact arm subject to movement by the switch operating mechanism while the other switch contact is stationary.

31. (canceled)

32. (original) A switch in accordance with claim 27 where:

the whip, the latch, and the respective contacts are further arranged such that during an opening operation, after flexing of the whip against the latch and separation of the whip from the latch occurs, an electric arc is drawn

between a tip of the conductive path on the whip second portion and the roller of the latch, and during a closing operation an electric arc is drawn between the whip first portion and the cam bar of the latch.

33.-42. (canceled)

43. (currently amended) The switch of claim [[41]] 82 where:

the latch includes a conductive metal rod and a conductive wheel having a circumferential surface;

the whip and latch are arranged for sliding conductive engagement between the surface conductive path of the whip tip-end portion and the circumferential surface of the latch wheel before the whip finally separates from the latch in a switch opening; and

the latch also includes a conductive latch camming surface in an arrangement with sliding conductive engagement, during a switch closing, between the whip and the latch camming surface and rod without contact of the whip with the wheel.

44. - 51. (canceled)

52. (Currently amended) The switch of claim [[38]] 79 where:

the latch also includes a conductive latch camming surface in an arrangement with sliding conductive engagement, during a switch closing, between the whip and the latch camming surface and rod without contact of the whip with the wheel.

53. (Previously Presented) The switch of claim 43 where:

the whip has a metal base portion connected at a first end with a movable support of a first main switch contact and at a second end with the tip-end portion with a

joint between the base portion and the tip-end portion with the joint providing part of the conductive connection;

the joint between the whip base and tip-end portions is located, in relation with the latch, to provide the conductive engagement, during a switch closing, between only the base portion of the whip with the latch.

54. (Previously Presented) The switch of claim 53 where:

the rods of the whip tip-end portion contain fiber reinforced plastic and the surface conductive path includes at least one conductor comprising metal strands over the surface of the first rod with interstitial sites between strands where an adhesive bonds sides of the strands with the rod surface, the outermost exposed surface of the strands being substantially free of the adhesive; and

the joint between the whip base portion and tip-end portion includes a metal spine located within the interior of the tip-end portion and firmly joined with the innermost rod of the one or more additional nonmetal rods and the joint also includes a metal socket within which the joined ends of the whip portions are firmly located.

55. (New) An electrically conductive whip-like contact structure comprising:

a flexible rod;

a conductive path along an exterior surface of the rod, the conductive path including one or more metal conductors selected from the group consisting of a metal braid and a metal wire, the one or more metal conductors including metal strands bonded to the rod surface by an adhesive at interstitial locations between the metal strands.

56. (New) The structure of claim 55 where:

the adhesive includes a resinous material containing metallic particles.

57. (New) The structure of claim 55 where:

the adhesive includes at least one resinous material selected from the group consisting of epoxy resin, urethane resin, and silicone resin and contains metal particles.

58. (New) The structure of claim 57 where:

the rod is tapered and comprises fiber-reinforced plastic material.

59. (New) The structure of claim 58 where:

the one or more conductors have greater conductivity than the adhesive; and

the outermost, exposed, surface of the metal strands is substantially free of the adhesive.

60. (New) The structure of claim 59 where:

the conductive path comprises a tubular metal braid directly on the exterior rod surface with the adhesive on the exterior rod surface at at least some of the interstitial locations between the strands.

61. (New) The structure of claim 58 where:

the flexible rod is a first rod in a rod assembly with at least a second tapered rod located within a part of the first rod and the rods have blunt ends at a common axial position.

62. (New) The structure of claim 61 further comprising:

a substantially all-metal rod portion having an end joined with the blunt ends of the rods in the rod assembly with the conductive path on the first rod of the rod assembly conductively connected with the all-metal rod.

63. (New) The structure of claim 56 where:

the rod is tapered and comprises a nonmetallic material;

the one or more metal conductors have greater conductivity than the adhesive;

the conductive path comprises a tubular metal braid directly on the exterior rod surface with the adhesive bonding between sides of strands of the braid and the rod surface and with the outermost, exposed, surface of the metal strands substantially free of the adhesive;

the flexible rod is a first rod in a rod assembly with at least a second tapered rod located within a part of the first rod and the rods have blunt ends secured together at a common axial position; and, in addition,

a metal rod portion has an end joined with the blunt ends of the rods in the rod assembly with the conductive path on the first rod of the rod assembly conductively connected with the metal rod.

64. (New) The structure of claim 62 further comprising:

a metal spine within at least the blunt end of the rod assembly with an innermost rod of the rod assembly joined together with the metal spine.

65. (New) The structure of claim 64 where:

the rods of the rod assembly all comprise fiber-reinforced plastic material; and

a joint between the end of the all-metal rod portion and the ends of the rods of the rod assembly comprises a metal socket over the joined ends with the ends of the rods of the rod assembly and the metal spine firmly joined together.

66. (New) An electrically conductive whip-like contact structure comprising:

a tapered, elongated, and flexible member including first and second parts with an end of the first joined with an end of the second and with a taper proceeding along the member with smaller cross-sectional dimensions from a largest end of the first part to a smallest end of the second part;

the first part being of substantially all-metal material;

the second part having a different composition than the first part with a density less than that of the first part; and

the first and second parts each having an electrically conductive surface forming a continuous conductive path along the outside of the joined parts with the conductive path exteriorly exposed for contact along its length.

67. (New) The structure of claim 66 where:

the second part includes a tapered rod of nonmetallic material having one or more metal conductors thereon making up its electrically conductive path along the outside thereof; and

the second part is joined with the first part at a joint including a metal spine located within a central tapered hollow of the second part from a first axial point near the first part to a second axial point outside of the joint between the first and second parts.

68. (New) The structure of claim 67 where:

the metal spine is tapered in the same direction as the second part and is a member of a spring steel.

69. (New) The structure of claim 67 where:

the rod of nonmetallic material of the second part comprises fiber-reinforced plastic material and is a first

rod in a rod assembly that has, within the central hollow of the first rod, at least a second tapered, tubular rod that also comprises fiber-reinforced plastic material; and

the rod assembly, in a portion proximate the first part of the flexible member, has the rods thereof fit tightly together and an innermost rod of the rod assembly over a part of its length fits tightly together with the metal spine located within it.

70. (New) The structure of claim 69 where:

the one or more metal conductors on the second part include at least one conductor selected from the group consisting of a metal braid and a metal wire adhesively bonded to the surface of the first rod of nonmetallic material.

71. (New) The structure of claim 66 where:

the composition of the second part also has a greater specific strength than the all-metal material of the first part.

72. (New) The structure of claim 71 where:

the composition of the second part comprises a member selected from the group consisting of fiber reinforced plastics and metal matrix composites; and

the material of the first part comprises a member selected from the group consisting of beryllium-copper and stainless steel.

73. (New) The structure of claim 67 where:

the first part is a metal spring rod and the second part is a rod of fiber reinforced plastic polymer with a surface conductor comprising a wound wire or wire braid bonded to the polymer rod by a flexible conductive polymer adhesive; and

the first part and the second part are such that the first part imparts accelerating force to the second part after release of the second part from conductive engagement with another contact element during which the first part and the second part have been flexed.

74. (New) An air break switch comprising:

first and second main switch contacts movable relative to each other to produce a switch opening or a switch closing;

a whip and a latch, conductively connected with respective ones of the main switch contacts, that mutually conductively engage at least during part of a switch opening;

the whip having a structure including, at least in a tip-end portion that is last to separate from the latch in a switch opening, a flexible nonmetal rod with a surface conductive path comprising at least one conductor selected from the group consisting of a metal braid, a metal foil, a metal sheath, and a metal wire; and

the surface conductive path of the whip tip-end portion extends continuously along the length of the nonmetal rod from its tip to a conductive connection leading to the switch contact to which the whip is conductively connected.

75. (New) The switch of claim 74 where:

the nonmetal rod of the whip tip-end portion contains fiber reinforced plastic.

76. (New) The switch of claim 74 where:

the latch includes a conductive metal rod and a conductive wheel having a circumferential surface; and

the whip and latch are arranged for sliding conductive engagement between the surface conductive path of the whip tip-end portion and the circumferential surface of

the latch wheel before the whip finally separates from the latch in a switch opening.

77. (New) The switch of claim 75 where:

the nonmetal rod is a first rod in a rod assembly that has, within the first rod with the surface conductive path, one or more additional nonmetal rods arranged within a tapered hollow center of the first rod and firmly joined together at an inner end with an inner end of the first rod and spaced from each other and from the first rod at outer ends of the one or more additional rods.

78. (New) The switch of claim 77 where:

the one or more additional rods each contain fiber reinforced plastic.

79. (New) The switch of claim 78 where:

the latch includes a conductive metal rod and a conductive wheel having a circumferential surface; and

the whip and latch are arranged for sliding conductive engagement between the surface conductive path of the whip tip-end portion and the circumferential surface of the latch wheel before the whip finally separates from the latch in a switch opening.

80. (New) The switch of claim 74 where:

the whip has an initial contact region that is first to contact the latch during a switch opening and also first to contact the latch during a switch closing; and

the initial contact region has a conductive metal surface of relatively high weight and durability to better withstand arcing during initial switch opening and closing compared to the weight and durability of the conductive path over a majority of the whip tip-end portion.

81. (New) The switch of claim 80 where:

the whip initial contact region is on the portion of the whip including a nonmetal rod and the conductive metal surface of the initial contact region includes some conductive metal in addition to that of the conductive path on the majority of the whip portion including a nonmetal rod; and

the nonmetal rod of the whip tip end portion contains fiber reinforced plastic.

82. (New) An air break switch comprising:

first and second main switch contacts movable relative to each other to produce a switch opening or a switch closing;

a whip and latch, conductively connected with respective ones of the main switch contacts, that mutually conductively engage at least during part of a switch opening;

the whip having a structure including, at least in a tip-end portion that is last to separate from the latch in a switch opening, a rod assembly of a first flexible nonmetal rod with a surface conductive path and one or more additional nonmetal rods arranged within a tapered hollow center of the first nonmetal rod and firmly joined together at one end with an inner end of the first rod and spaced from each other and from the first at outer, tip, ends of the one or more additional rods; and

the surface conductive path of the whip tip-end portion extends continuously along the length of the first nonmetal rod from its tip to a conductive connection leading to the switch contact to which the whip is conductively connected

83. (New) The switch of claim 82 where:

each of the nonmetal rods of the whip tip-end portion contains fiber reinforced plastic.

84. (New) The switch of claim 82 where:

the surface conductive path comprises at least one conductor selected from the group consisting of a metal braid, a metal foil, a metal sheath, and a metal wire.

85. (New) The switch of claim 83 where:

the latch includes a conductive metal rod and a conductive wheel having a circumferential surface; and

the whip and latch are arranged for sliding conductive engagement between the surface conductive path of the whip tip-end portion and the circumferential surface of the latch wheel before the whip finally separates from the latch in a switch opening.

86. (New) The switch of claim 82 where:

the whip has an initial contact region that is first to contact the latch during a switch opening and also first to contact the latch during a switch closing; and

the initial contact region has a conductive metal surface of relatively high weight and durability to better withstand arcing during initial switch opening and closing compared to the weight and durability of the conductive path over a majority of the whip tip-end portion.

87. (New) The switch of claim 86 where:

the whip initial contact region is on the portion of the whip including a nonmetal rod and the conductive metal surface of the initial contact region includes some conductive metal in addition to that of the conductive path on the majority of the whip portion including a nonmetal rod; and

the nonmetal rod of the whip tip end portion contains fiber reinforced plastic.